

CLAIMS: I CLAIM:

1. A structural column, comprising:

- a plurality of column components, said column components including a plurality of column panels, each column panel comprising a top edge, a bottom edge, a first flat side, a second flat side, an inward-facing surface and an outward-facing surface, said first flat side oriented at a predetermined angle from said second flat side,
- a plurality of said column panels being aligned in a first horizontal array about a vertically oriented central axis, such that said predetermined angle is of a magnitude to allow inward-facing surface of said first flat side of one column panel to align with said inward-facing surface of said second flat side of an adjacent column panel,
- a plurality of said column panels being aligned in a second horizontal array of column panels, similar to said first horizontal array,
- said first and second horizontal arrays of column panels being aligned along said vertically oriented central axis to form two adjoining horizontal arrays, wherein at least one column component within said first horizontal array being attached to a component within said second horizontal array, and at least one column component within said second horizontal array being attached to a component within said first horizontal array,
- at least one of said column panels of said first horizontal array being of a substantially different vertical length from other column panels therein such that said bottom edges of column panels within said first horizontal array are offset in different horizontal planes from each other and said top edges are generally in the same horizontal plane, and at least one of said column panels of said second horizontal array is of a substantially different vertical length from other column panels therein such that said top edges are offset in different horizontal planes from each other and said bottom edges are generally in the same horizontal plane,
- said first and second flat sides of at least one offset column panel in said first horizontal array being attached to at least second and first flat sides, respectively, of an offset column panel in said second horizontal array,
- said column panels being staggered within said first and second horizontal arrays, so as to form a staggered relationship having a plurality of seams, said seams occurring where said top and bottom edges of said column panels meet, said seams lying in substantially

different horizontal planes from each other throughout said column,
said column panels within said column being offset, or staggered, thereby creating column
strength.

2. The structural column of claim 1, further including at least one intermediate horizontal array that lies between said first and second horizontal arrays, said top edges of column panels within said intermediate horizontal array aligning with said bottom edges of column panels within said first horizontal array, said flat sides of at least one column panel in said intermediate array aligning with said flat sides of a column panel in said first horizontal array, said flat sides of another column panel in said intermediate array aligning with said flat sides of a column panel within said second horizontal array, and said column panels within said intermediate horizontal array maintaining said staggered relationship.
3. The structural column of claim 1, further including a plurality of additional column components, said column components including said column panels and at least one column splice panel, said column splice panel having a top edge, a bottom edge, a first flat side, and a second flat side, said first and second flat sides oriented from each other by an angle similar to said predetermined angle of said column panels, said first and second flat sides of said column splice panel being attached to said outward facing surfaces of said first and second flat sides of at least two underlying vertically-aligning column components, respectively, said column splice panel overlapping said seam where top and bottom edges of said underlying vertically-aligning column components meet, thereby serving as a splice to cover said seam of underlying column components, and creating an outer layer and at least one underlying, adjacent layer of column components, thereby strengthening said column.
4. The column component of claim 3 wherein at least one of said column components further includes a plurality of vertical angles that run the entire vertical length of said column component, thereby enhancing column strength and also providing vertically oriented ledges to which beams may be attached

5. The column component of claim 3 wherein at least one of said column components further includes a horizontally-oriented arc that extends the vertical length of said column component, such that said flat sides are bisected by said arc in horizontal cross section.
6. The structural column of claim 1, further including a column spacer plate that is sandwiched between flat sides of said column components to take up a gap and maintain a required thickness throughout said column and to enhance the strength of said column, said spacer plate comprising at least one outer-side edge.
7. The spacer plate of claim 6 wherein said column spacer plate is substantially elongated, rectangular, and substantially flat, said column spacer plate further comprising an inner-side edge and an outer-side edge, a plurality of spacer plates being arrayed about said vertical central axis, said inner-side edges meeting adjacent said central axis, said inner side edges of all spacer plates within at least one horizontal array of said spacer plates being welded together at points along said central axis.
8. The spacer plate of claim 6 wherein said column spacer plate is similar in configuration to said column panels, said spacer plate comprising first and second flat sides and two outer-side edges, said spacer plate having a predetermined thickness that maintains said required thickness throughout said column.
9. The spacer plate of claim 6 wherein said outer-side edge extends beyond said side edge of said column component, thus providing, in effect, tabs to which structural components such as beams and wall panels may attach.
10. The structural column of claim 1 wherein at least one elongated U-shaped clip surrounds and attaches to exposed side edges where column components adjoin, thereby creating a smooth edge, increasing structural integrity of said column, and protecting said column components from destructive environmental factors and climatic conditions.

11. The structural column of claim 1 wherein at least one of said column component side edges is extended and curved back towards said central axis of said column, thus forming a U-shaped side edge that surrounds and attach to at least one of said flat sides of at least one of said adjacent column panels, thereby creating a smooth edge, increasing structural integrity of said column, protecting said column components from destructive environmental factors and climatic conditions, and eliminating a need for a separate elongated U-shaped clip.
12. The structural column of claim 1 wherein said column components have a gradation in thickness, such that thicker components are generally in lower horizontal arrays and thinner components are generally in upper horizontal arrays.
13. The structural column of claim 1 wherein said column components have gradations in width of flat sides, such that components with wider flat sides are generally in lower horizontal arrays and components with narrower flat sides are generally in upper horizontal arrays.
14. The structural column of claim 1, further including structural components, said structural components being attached to a plurality of said columns to form a structure, said structure having a geometric shape in horizontal cross section, said structural components comprising a plurality of wall panels and horizontal cross members that join one column to another and attach directly to column components, thus forming multiple horizontal strata of said structure, said strata including a top horizontal stratum, at least one intermediate horizontal stratum, and a bottom horizontal stratum.
15. The structure of claim 14 wherein at least one of said additional horizontal cross members is sandwiched between said inward-facing surfaces of said columns and attached thereto.
16. The structure of claim 14 wherein at least one said additional horizontal cross members joins two columns and attaches to said outward-facing surface of said

columns.

17. The structure of claim 14 wherein at least one of said additional horizontal cross members further comprises a plurality of horizontal corrugations.
18. The structure of claim 14 wherein at least one of said additional horizontal cross members further comprises a plurality of vertical corrugations.
19. The structure of claim 14 wherein said horizontal cross members are wall panels that are substantially rectangular in shape, and comprise a top edge, a bottom edge, and two side edges, and said wall panels aligning with one another vertically to form a wall, or partition, said wall beginning and ending at predetermined vertical heights along said column.
20. The wall panel of claim 19 wherein said wall panels have at least two substantially different vertical lengths, so as to create a stagger of substantially horizontally-oriented seams between wall panels, such that no seam, where top and bottom edges of wall panels meet, is in the same horizontal plane as seams from adjacent walls.
21. The wall panel of claim 19 wherein said wall panels have at least two substantially different horizontal lengths, so as to create a stagger of substantially vertically-oriented seams, where side edges of wall panels meet, such that no said vertically-oriented seam is in the same vertical plane as seams from adjacent wall panels.
22. The wall panel of claim 19 wherein said wall panels are attached to outward-facing surfaces of column components such that parallel, outward-facing surfaces have wall panels attached thereon to form a wall that comprises two walls that are parallel to each other with a gap therebetween.
23. The wall panel of claim 19 wherein said wall comprises a plurality of wall

panels, said wall panels with surfaces aligned together and having substantially no gap between them, so as to form a multi-ply wall.

24. The wall panel of claim 19, further including a plurality of boreholes along said top, bottom, and side edges to allow fastening means to column and structural components.
25. The wall panel of claim 19 wherein said wall splice panels cover said horizontally-oriented wall seams where said top and bottom edges of wall panels meet, said wall splice panel being attached directly to a next upper wall panel and extending below said seam to attach to a next lower wall panel.
26. The wall splice panel of claim 25 wherein said wall splice panel attaches directly to outward-facing surfaces of column components, with a wall spacer plate sandwiched between said wall splice panel and said wall panels, said wall spacer plate being substantially rectangular.
27. The structure of claim 14 wherein at least one of said horizontal cross members is a beam, said beam comprising a plurality of I-beams, C-beams, tube-steel beams, and beams with angle flanges, said beam comprising top and bottom edges and two side edges, at least one side edge attached directly to said column component with fastening means.
28. The structure of claim 14 wherein at least one of said horizontal cross members is a beam, said beam comprising an upper flange, a horizontal corrugation, a lower flange, and two side edges, at least one side edge attaching to said column components with fastening means.
29. The beam of claim 28 wherein at least one of said beams is a hopper support beam, said hopper support beam being attached directly to a column and supporting a hopper panel, said hopper panel being sloped downward at a predetermined angle, said predetermined angle generally ranging from about 30

to about 60 degrees from a vertical plane, said corrugation of said hopper support beam aligning with said predetermined angle, said hopper panel arrayed about a central axis to form a hopper, said hopper comprising a top edge and a lower aperture, said top edge being attached to said hopper support beams.

30. The structure of claim 14, further including diagonally-oriented beams, said diagonal beams attaching to at least one of said column components, said column components comprising said column panels, said column splice panels, and further including said column spacer plates.
31. The structure of claim 14, further including a plurality of hoppers, said hopper comprising a top edge and a lower aperture, said plurality of hoppers having said top edges attached to said columns on at least one predetermined vertical height.
32. The structure of claim 14 wherein said structure comprises a plurality of arced horizontal cross members in horizontal cross section to form a round structure, said columns being arrayed along the arc of said cross members and attached to said structure, thereby serving as both stiffeners and structural support columns.
33. The structure of claim 14 wherein one of said columns attaches at or near a location where a side edge of one said horizontal cross member aligns with a side edge of another horizontal cross member, said column thus effectively covering a vertically-oriented seam where side edges of horizontal cross members meet or nearly meet, thus serving as a side support column, and thereby extending the horizontal length of a side of said structure.
34. The structure of claim 14 wherein at least one of said horizontal cross members attaches to said columns that extend above said walls of said structure, thereby forming at least one upper level above said walls
35. The structure of claim 14 wherein at least one of said horizontal cross members attaches to at least one said column to form a structural load-bearing tower.

36. The structure of claim 14 wherein said structure can be erected, using jacking means, within an existing structure, thereby utilizing existing infrastructure.
37. The structural column of claim 1, further including an anchoring means attached to the base of said column.
38. The anchoring means of claim 37, further including a base plate that is attached with fastening means substantially horizontally to the very bottom of said column, said base plate having vertically oriented boreholes through which anchor bolts from a foundation may pass
39. The anchoring means of claim 37, further including a base plate that is welded to vertical flanges, said vertical flanges mating with outside surfaces of column panels at base of said column, said vertical flanges having substantially horizontally-oriented boreholes that align with boreholes of said column panels for fastening means, said base plate having substantially vertically-oriented boreholes through which anchor bolts from a foundation may pass.
40. The anchoring means of claim 37 wherein tabs are delimited along said bottom edges of column panels at base of said column, said tabs being bent outwardly and horizontally from said column panels, and said tabs attached with fastening means to a foundation.
41. The anchoring means of claim 37 wherein tabs are delimited along said bottom edges of column panels in said second horizontal array, said tabs being bent outwardly and horizontally from column panels of said second horizontal array, said tabs being attached with fastening means to a base plate, said base plate having vertically oriented boreholes through which anchor bolts from a foundation may pass.
42. The structural column of claim 1 wherein a plate is attached in a substantially

horizontal plane to the very top of said column to provide, for example, a support panel on which roof components, mezzanine structures, distribution tracks, and equipment may rest.

43. The structural column of claim 1, further including separations between said top and bottom edges of said vertically-aligning column components, said separations being of a predetermined magnitude, said predetermined magnitude generally not exceeding a thickness of said column components, thereby allowing said column to better withstand bending, twisting, expansion, and contraction forces.

44. A structural column, comprising:

a plurality of column components comprising a top edge, a bottom edge, two side edges, a first flat side, and a second flat side,
said plurality of column components comprising column panels,
a plurality of said column panels arrayed horizontally about a vertically-oriented central axis to form a horizontal array, said first and second flat side of said column panel being oriented at a predetermined angle from each other such that said first flat side from one column panel aligns with said second flat side of another column panel that is adjacent thereto within said horizontal array,
said column further comprising at least a first horizontal array and a second horizontal array,
said column panels of said first horizontal array being of different lengths from each other, so that said bottom edges occur in substantially different horizontal planes from each other and said top edges generally occur in the same horizontal plane,
said column panels of said second horizontal array being of different lengths from each other, similar to those of said first horizontal array, so that top edges occur in substantially different horizontal planes from each other and said bottom edges are generally in the same horizontal plane,
such that said first flat side of at least one of said column panels in said first horizontal array aligns with said second flat side of at least one of said column panels in said second horizontal array, to connect said first horizontal array to said second horizontal array,

wherein seams, where said top and bottom edges of column panels meet, lie in distinctly different substantially horizontal planes from each other throughout the vertical length of said column, thereby forming a staggered relationship of column panels that creates structural strength within said column.

45. The column of claim 44, further including additional column components that are attached to said outward-facing surfaces of said column components, said column components comprising at least one column splice panel wherein said first and second flat sides of said column splice panel being attached to first and second sides, respectively, of said outward facing surfaces of at least two vertically-aligning underlying column components, respectively, said column splice panel overlapping said seam of said underlying column components, thus effectively covering said seam of underlying column components and creating a plurality of layers of column components, said layers comprising an outer layer of column components and an inner layer of column components wherein staggered relationships with seams are formed, said seams occurring in different horizontal planes from said seams of adjacent layers.
46. The column of claim 44, further including a column spacer plate that is sandwiched between flat sides of said column components to take up a gap and maintain a required thickness throughout the column when needed, thereby enhancing the strength of the column.
47. The column of claim 44 wherein a plurality of columns are attached to horizontal cross members and are arrayed to form a structure, said structure comprising a geometric shape in horizontal cross section, a plurality of horizontal cross members comprising wall panels and beams, said structure comprising a top horizontal stratum and a bottom horizontal stratum, said top horizontal stratum comprising said column components from said first horizontal array of column panels and said horizontal cross members attached thereto, and said bottom horizontal stratum comprising said column components from said second horizontal stratum and said horizontal cross members attached thereto.

48. The structure of claim 47 wherein said columns are arrayed around and attached to the perimeter of said structure, said structure having a circular horizontal cross section, said wall panels being arcuate in horizontal cross section and attached to column components, said columns thereby serving as stiffeners and structural support columns.

49. The structure of claim 47, further including multiple compartments with shared walls, said structure constructed with a jack-lifting construction means, said construction means comprising generally the following steps:

- (1) said top horizontal stratum, including said column components and said attached horizontal cross members, is assembled at or near ground level,
- (2) jacks are connected to bottom of said top horizontal stratum, which is then jack-lifted a vertical distance to allow a next-lower intermediate stratum to be attached to said top horizontal stratum,
- (3) offset column panels within said intermediate stratum that extend above are attached to corresponding offset column panels in said top horizontal stratum that extend below said intermediate stratum,
- (4) jacks from said top horizontal stratum are removed therefrom and re-attached to the bottom of said intermediate horizontal stratum,
- (5) said intermediate horizontal stratum, with top horizontal stratum attached, is then jack-lifted a vertical distance to allow another next-lower horizontal stratum to be attached,
- (6) step 5 is repeated as each additional stratum is attached, until a predetermined vertical height is achieved, jacks are removed, and the structure is anchored to a foundation.

50. A structural column comprising:

a plurality of column legs arrayed about a central vertical axis, each of said legs comprising a first flat side and a second flat side, each flat side comprising an inward-facing surface and an outward-facing surface,
said inward-facing surface of said first flat side of one leg parallels and meets or nearly meets said inward-facing surface of said second flat side of another leg,

each of said legs further comprising a plurality of vertically-aligning column panels,
wherein each column panel comprises a top edge, a bottom edge, first and second flat
sides that correlate with said first and second flat sides of said leg, and inward- and
outward-facing surfaces that correlate with said inward- and outward-facing surfaces of
said leg,
wherein all seams, where said top and bottom edges of vertically aligning column panels
meet, occur in different substantially horizontal planes from each other along the entire
length of said column, whereby creating a staggered relationship of said column panels
throughout said column, thereby creating column strength.

51. A structure, comprising:

a plurality of columns and horizontal cross members, said columns and horizontal cross
members interconnecting with one another to form at least one compartment,
said horizontal cross members comprising wall panels and support beams that attach to said
columns, said columns arrayed at corners of said structure where said horizontal cross
members meet or nearly meet,
said wall panels being generally rectangular in shape, each comprising a top edge and a
bottom edge, and arrayed vertically with top and bottom edges aligning to form walls
of a predetermined vertical length,
said columns comprising column panels, each said column panel comprising a top edge,
bottom edge, two side edges, a first flat side, a second flat side, an inward-facing
surface and an outward-facing surface,
wherein a plurality of said column panels are aligned in a horizontal column panel array
about a vertically-oriented central axis, such that said inward-facing surfaces are
oriented toward each other, and said first flat side of one column panel aligns with said
second flat side of an adjacent column panel within said horizontal array,
said columns further comprising a plurality of said horizontal column panel arrays wherein
said horizontal column panel arrays are aligned along said vertically-oriented central
axis to form multiple vertically aligning horizontal column panel arrays comprising one
top column panel array, one bottom column panel array, and any number of
intermediate column panel arrays that lie between said top and bottom column panel
arrays,

said column panels being offset, or staggered, one from another such that seams, where said top and bottom edges meet, lie in distinctly different substantially horizontal planes from each other throughout the vertical length of said column, whereby creating column strength due to a staggered arrangement of said column panels, said staggered arrangement being established by at least one column panel within said top array having a different vertical length from other column panels within said top array, and by at least one column panel within said bottom array having a different vertical length from other column panels within said bottom array, and said structure comprising a plurality of strata comprising a top stratum, a bottom stratum, and at least one intermediate stratum that adjoins said top and bottom strata, each of said strata comprising a plurality of column panel arrays from a plurality of columns, and a plurality of horizontal cross members, said column panel arrays and said cross members being of substantially similar vertical heights to each other,

52. The structure of claim 51 wherein a plurality of said columns extends continuously above said compartment to serve as columns that can support at least one upper level compartment above said compartment.

53. The structure of claim 51 wherein a plurality of said columns extends continuously below said compartment, to serve as structural support columns for said structure.

54. The structure of claim 51, further including a plurality of interconnected compartments.

55. The plurality of interconnected compartments of claim 54, further including a construction means, said construction means comprising a jack-lifting method, said jack-lifting method generally comprising the following steps:

- (a) assembling said top stratum and adding additional embodiments, such as a roof and equipment, at or near ground level,
- (b) attaching jacking apparatus to bottom edges of said column components of said top stratum,
- (c) jack-lifting said top stratum a vertical distance to allow attaching said intermediate stratum,

- (d) attaching said intermediate stratum, removing jacking apparatus, re-attaching said jacking apparatus, and jack-lifting said intermediate stratum a vertical distance to allow a next lower stratum to be attached,
- (e) repeating step (d) until a predetermined vertical height is achieved,
- (f) attaching said bottom stratum, removing jacking apparatus, and anchoring said plurality of interconnected compartments to a foundation.

56. A method of constructing a structure, comprising:

- (1) providing a plurality of columns and horizontal cross members, said columns comprising multiple vertically-aligning column components in which adjacent seams are in substantially different horizontal planes from each other, said horizontal cross members comprising wall panels and beams, said horizontal cross members interconnecting said columns, so that said structure has multiple compartments, said multi-compartmented structure having a plurality of horizontally oriented strata comprising a top stratum, a bottom stratum, and at least one intermediate stratum, each of said strata comprising staggered column components,
 - (2) assembling a top stratum and any embellishments, such as a roof and equipment, that extend above said top stratum, attaching jacks to bottom edges of said top stratum and jack-lifting a vertical distance to allow adding a next lower stratum, attaching ascending top edges of said intermediate stratum to descending bottom edges of said top stratum,
 - (3) removing jacks from bottom edges of said top stratum and attaching jacks to bottom edges of said intermediate stratum,
 - (4) jack-lifting said intermediate stratum, with top stratum attached thereto, a vertical distance to allow additional intermediate strata to be attached, and adding intermediate strata until a predetermined vertical height is achieved,
 - (5) and attaching said bottom stratum, removing jacks, and anchoring said structure to a foundation,
- whereby all components of said multi-compartmented structure can be constructed at or near ground level using jacking means.

57. A structural column, comprising:

a plurality of column layers that comprise at least an inner layer and an outer layer, said layers comprising a plurality of column components, said column components comprising column panels and column splice panels, each of said column component further comprising a top edge, a bottom edge, a first flat side, a second flat side, an inward-facing surface, and an outward-facing surface, said first flat sides of column components being oriented at a predetermined angle from said second flat sides,

said inner layer comprising column panels that are arrayed horizontally about a vertically oriented central axis to form at least one horizontal array, such that said inward-facing surfaces of said first flat sides of column panels generally converge in parallel with, and are attached with fastening means to, said inward-facing surface of said second flat sides of adjacent column panels within said horizontal array,

said inner layer further comprising a plurality of said horizontal arrays of column panels that are aligned along said vertically oriented central axis, such that top and bottom edges of column panels from adjacent horizontal arrays meet, thus creating seams, to form vertically-aligning arrays comprising at least a top horizontal array and a bottom horizontal array,

said outer layer comprising column splice panels that overlap said seams within said inner layer, wherein top portions of said column splice panels attach to bottom portions of column panels within a next upper array of said inner layer, and bottom portions of said column splice panels attach to top portions of column panels within a next lower array of said inner layer, said column splice panels aligning vertically with each other within said intermediate layer so that seams are created where said top and bottom edges of said column splice panels meet,

characterized in that said column has a plurality of layers in which seams from adjacent layers are in different horizontal planes from each other.